# SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

**FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.**

No. 1090.—Vol. XXVI.] LONDON, SATURDAY, JULY 12, 1856. [GRATIS.

### RATING OF MINES TO THE POOR.

SIXTH DAY—Friday, July 4.

he Committee again assembled this day at 12 o'clock, and called—

r. Carlyon, of St. Austell, who stated that he lived in the centre of e mining district, and had given much attention to mining matters, with which s concerned professionally, but more on behalf of the lords than the adventur- He was chiefly concerned for Major Carlyon, who was lord of Boscundle, Great ls, Pembroke and East Crinnis, and West Crinnis United Mines, and many other er mines. Great Crinnis was the same mine that had been formerly worked, aid from the returns of ore dues to the amount of 20,000*l.* per year. At that the royalty was 1-8th. He thought the returns yielded a profit of about 200,000*l.* ates to the poor were paid out of these royalties; but the present grants were ted. The rates formerly paid were on 2-5ths of the dues; all mines were so at that period. Under the then parochial system property was rated lower than sent. He had referred to the rate so far back as 1826, and he found that the were made on 2-5ths of the dues. This was confirmed by the printed report of King *v.* St. Austell," up to which period the mines were rated. In the last five , they had granted sixteen leases, none of which were other than for money pay- . Great Crinnis and Boscundle were in the parish of St. Austell. With the ex- n of Great Polgooth, which was partly the property of the Earl of Mount-Edg- e, and whose dues, he believed were received in kind, there was not another sett istence in St. Austell paying dues in kind; its total ratable value was 73*l.* per Par Consols, in St. Blazey parish, was rated at one time, but he believed it was now, as there had been a new grant. There were no mines of any consequence in St. Blazey or St. Austell rated to the poor. He did not conceive that mines ht any extra proportion of poor; and there was but a very slight increase in roportion of deaths. The average of the kingdom was 1 in 17, and in Cornwall 9. Mining paupers did not exceed the agricultural by more than 2 per cent. mount of rates in their parish were lower than any other in the kingdom. The of the miners were shorter than the agriculturists. But there was no propor- f these thrown upon the parish, as the doctor and club funds were sufficient up time of their decease to support them. As regards their widows and orphans, ines would employ a great number of them, as women and children were largely ed at surface, the children being enabled to go out to work at a very early of life. In St. Austell there was a great deal of cottage building, especially on rt of the miners, who were very anxious when they had the money to build . With respect to the exemption of miners from paying poor-rates, he would at it was to the interest of the working miner that the mines should not be as any increased burthen on them would decrease his profits in a much greater than when mines were relieved from the rates.

the Chairman—There were a number of clay-pits in St. Austell to the poor. Could not say that the owners of clay and the agriculturists were ctly contributing to pay the rates for the miners, or that the whole of the bur- f the poor was thrown upon the other ratable property, but thought that mines a great benefit to other property. He did not, however, look on it as a question ing; but considered mines were of so speculative a character that it would be to rate them. Mining was a great speculation and risk, and a heavy burthen e who carried it on; whilst, on the other hand, it was a source of great profit ain to those who lived in the parish where it was carried on, and by that means buted indirectly to the poor. He could not view the lord's property as an un- ound farm. In mineral property, the lord had a certain amount of capital as it ; and if he were to purchase any given property, it would be with the know- that there were certain minerals beneath, and his purchase would be regulated ingly; and, therefore, every portion of that which was taken away made his l so much less. He did not like to give an individual opinion on the question ing, but, in the abstract, he considered the difficulties were so great, that he not impose a rate at all, either on the lord or the adventurers. The profits of rds formerly were greater than at present; and in St. Austell the lords granted -half of what they were, which was on account of the large capital required. ues paid by the present Great Crinnis Company were 1-16th when working at t, and 1-24th whilst working at a loss. He thought that mines ought not to ed, and he had scarcely spoken to a person in the neighbourhood who was not nion that it would be unadvisable to rate mines. He concurred in that opinion, benefit conferred on the district by the consumption of its produce was great. mining was commenced in St. Austell it was a very small parish, but since were opened it had gradually increase to its present dimensions, and was still increase. About 1847, there was some distress in the district, occasioned by gh price of corn, and the agriculturists were the first to find the difficulty of ng the increased charges of the labourers, who were very scarce.

the Committee—The mining tenements were formerly let on lease years, or three lives; but they were now getting into the mode of granting for rs. The ratable value of the parish was about 69,000*l.* The miner generally on a waste spot of ground when desirous of building a house, for which he has e. In the event of the mine not answering, he could sell if he thought proper. ought there was no great hardship inflicted on other property by the exclusion ses. Up to the time that Great Crinnis was abandoned by the former adven- it paid the poor-rates. There was no practical difficulty in rating the mines for whether they were profitable or not the lord received his dues. The pro- n of miners on the parish were smaller than that of other labourers. There great difference between coal and metallic mines; as in the former owners prohibited from employing children, whilst in copper mines they were employed face at a very early period of life. According to the Parliamentary returns for he total number of females employed in copper mines was 3846, of whom 2353 under 20 years of age; whilst, out of 2643 females employed in coal mines, nly were under that age. The fair inference, therefore, was that the miners' es do not become chargeable to the parish, because they could maintain them- by working in the mines. The benefit derived by the inhabitants of a dis- was seen in the increased value of the ratable property. A farm would let in ing district at a higher rate than it would at a distance; added to which, the s built cottages, the rent of which being under 6*l.*, in a great number of in- s, the burthen did not fall upon him. The quantity of ground enclosed by this was very great. Besides which, the starting of a mine in a peculiarly agricul- district would cause a greater demand for labour; and as the miner's wages ded upon the demand for his services, it followed that the greater the demand bour the higher would be the rates paid. When mines ceased in any district, ners were compelled to seek employment elsewhere, and did not increase, there- he poor. There were a great number of mines now being worked in the county nwall at a loss, and it would be impossible so say what the effect would be if ere stopped. In St. Austell and St. Blazey the rates were low. Rates were in agricultural districts than in mining. Taking a number of parishes, he that the average rate for the last five years was 2s. 8d. in 1*l.* In Menagessey, 022 inhabitants, in 1854, the poor-rate was 4s. 6d. in 1*l.*, and the highway rate making together 5s. 6d. They were in the same parish, in 1855, 5s. 6d. and 1s., 6d. Gorran, population 1188, poor-rate, 1854, 2s.; highway rate, 4d. in the . Michael Carhays, population 191, poor-rate, 1854, 2s.; highway, 7d.; 1855, ate, 2s.; highway, 10d. St. Ewe, population 1544, rate, 1854, 3s. 2d.; high- 0d.; 1855, rate, 2s. 3d., and 9d. highway. St. Meven, population 1234, poor- 854, 1s. 6d.; highway, 1s. 3d.; 1855, poor-rate, 2s.; highway, 1s. 3d. Gram- population, 589, poor-rate, 1854, 4s. 6d., and, 1855, 5s. 8d.; no highway rate. phen's, population 2711, poor-rate, 1854, 1s. 10d.; highway, 1s. 10d.; 1855, ate, 2s. 2d.; highway, 1s. 10d. St. Dennis, population 888, poor-rate, 1s. 1d., ay, 6d., in 1854; and, in 1855, poor-rate, 2s. 5d.; highway, 6d. Roche, popu- 1863, poor-rate, 1854, 3s.; highway, 5d.; 1855, poor-rate, 2s. 10d.; highway, St. Austell, population 10,750, poor-rate, 1854, 2s. 6d.; highway, 10d.; 1855, ate, 3s.; highway, 10d. St. Blazey, population 3570, poor-rate, 1854, 2s. 4d., 1355, 1s. 8d. Tywardreath, population 3287, poor-rate, 1854, 2s. 8d.; high- 0d.; 1855, poor-rate, 2s. 4d.; highway, 4d. St. Samson, population 385, poor- 854, 1s. 10d.; 1855, 2s.; and Fowey, with a population of 1452, poor-rate, 1854, ; highway, 4d.; 1855, poor-rate, 2s. 1d.; highway, 4d. From these figures be seen that the rate in Menagessey, in 1854, was 4s. 6d. in 1*l.*, and in Gram- 5s. 6d., which were agricultural, as was also Roche, in all of which the rates igher than in St. Austell, where it was 3s., in 1854, and 3s. 10d. in 1855. Yet was only one mine in the parish of St. Austell paying dividends. Polgooth losing concern, and a large outlay had been expended to re-constitute it; but on its last legs for some time, as was also Crinnis.

the Committee—When the lease was applied for by Mr. Morcom, scundle, the question of rates was canvassed. The ground was considered to urable, and it was so doubtful whether it would be taken or not, being a re- ed mine, that it was agreed Mr. Morcom should have it at a money rent, and th dues for the first two years. He considered it would be an unfair proceed- lter existing grants, based upon the assumption that the dues would be free l parochial outgoings. Both the lord and the adventurer thought that no rate e paid; but the proposed legislation would alter their contracts, and whether was divided or not, both would be prejudiced to that amount. If it was right to rate mines, he saw no objection to the lord being rated on princi- considered that he who personally received the dues ought to be on the rate but, under existing contracts, the burthen would fall upon the adventurer. If were made prospective, it would be a matter of arrangement between the adventurer when existing agreements terminated. He could not see that re profits; and if the lord were rated to the full amount of the dues, it would be contrary to the principle of the Assessment Act. When a mine ceased to work, the greater part of the mining population would, being a migratory population, go to other districts, and could not become chargable to the parish. The produce of mines was taken away by the farmers' carts, from which the farmers received benefit. Mr. Carlyon was then examined as to the extent and usefulness of the doctor and club, and stated that every mine had its own fund; and that in cases where there were large families, the adventurers took the matter into their consideration. He had never heard of an instance in which a parish officer refused to relieve the miners' family on the ground that they had a club. He contended that mines brought no burthen on the parish, and that where there were no mines there would be no miners, and, consequently, no rate required; and gave it as his opinion, that where mines were working at a profit, they did a great deal of good, by keeping up the price of agricultural produce, and giving higher wages to those employed than they would otherwise be likely to get.

Capt. S. Seccombe said—He was a mine agent in the neighbourhood of Liskeard, in East Cornwall, which was now a large mining district. Some called it a new district; but, many years ago, there was an extensive mine worked by Messrs. Williams, which returned considerable profits. There was also one which was said to have been worked about 200 years since. He was manager of the Phœnix Mines, in Linkinghorne, which were formerly worked in part as the Cornwall Great United. and the Clannacomb, Linkinghorne, and other names. It was now a considerable mine. They had sunk 173 fms. below the adit, which was 14 fms. from surface, and employed 257 persons at surface and underground. It was now a dividend-paying mine, and had been for about four years. In the new working they had expended 91,000*l.*, and returned ore to the amount of 112,000*l.*, on which they had to pay 1-18th dues; with the exception of a short period, when the mine was so very poor that the lord gave up the dues until they were in a position to pay them. The royalty was included in the item 91,000*l.* He had had the management of the mine for the last 17 years. The loss on the old Linkinghorne was between 40,000*l.* and 50,000*l.* They made a profit on the Phœnix Mine, which was the difference between 91,000*l.* expended and 112,000*l.* returned. Some ore was raised under the old working, but they did not get any copper until 100 fms. below the adit; whilst for some portion of the sinking they paid as much as 50*l.* per fathom. The profits on last year's workings were about 8000*l.* The Prince of Wales was the lord. They had not paid any rates since he had been on the mine, but the parish attempted to rate them at 400*l.* The case was carried to the Petty Sessions, at Launceston, and from thence to the Sessions at Bodmin, where the rate was quashed. In trying the question the parish spent from 90*l.* to 100*l.*, which might have been saved had they taken the trouble to ascertain their dues were in money payment. The highway returns for the parish of Linkinghorne, from Lady-day, 1838, to Lady-day, 1839, showed the total receipts to be 281*l.* 18s. 1d., and the disbursements 300*l.* 8s. 5½d.; whilst, in 1855-6, the receipts were 231*l.* 17s. 8½d., against 213*l.* 2s. expended. The total way rate received from Lady-day, 1838-9, to Lady-day, 1855-6 was 4957*l.* 4s. 6½d., and the total amount expended 4921*l.* 3s. They had a railway to the mine, but the highway rate was much the same. There were complaints at first from the other ratepayers because they paid the mine labourers 2s. per day, whilst others only paid 1s. 6d. He considered that, taken as a whole, mining up to a certain point fully compensated for the non-payment of rates, as mines had their doctor and club; whilst a great number of miners were rated on their tenements. Nearly every cottage paid a rate, which was at one time 1*l.* and then 2*l.*; whilst the number of cottages rated increased from 95, in 1842, to 280 in 1856, which were rated at 3*l.* They also employed some of the superfluous labour of the district, many of their labourers being farmers' sons. He thought that mines up to a certain time maintained the whole of their poor. They paid them 1s. per day each during the whole of the time they were sick, and when mines were abandoned the miners find their way to other districts. There was no instance in the district of miners applying to the parish. Miners were a class of men who, if they found they could get higher wages in other districts, left them at the end of their contract. They employed in the mine persons whose ages ranged from 7 years to 70. He had seen some who had applied for relief, but the poor miners did not become chargable to the parish to a greater amount than they had contributed; as, whenever they could, they purchased and built cottages, or made some other provisions for old age. He considered that the number of miners who did so were more than 12 per cent. of the mining population. They would, he thought, average more than that in Calstock, Linkinghorne, St. Clair, and St. Ive. His experience was chiefly in the eastern part of the county. He was 46 years of age, and had been employed 37 years in mines, beginning at the lowest stage. He considered that there were no losses sustained in this district in maintaining the mining poor, for when mines commenced, cottage property, then rated at 1*l.*, had since gone on increasing to 3*l.* Both the large and small farmers gained by the working of the mines. The former found it very convenient to receive the charge for horse hire monthly, and the latter felt the increased demand for cattle. The consumption of animal food in the parish was now from eight to ten times what it formerly was. As far as he knew, the parishioners were convinced that they received a benefit from the mines. He knew St. Cleer well, and had lived in the adjoining neighbourhood for 17 years. There the poor-rate, in 1837, was 2s. in 1*l.* In 1838, 2s. 6d.; 1839, 2s. 9d.; 1840, 3s.; 1841, 3s. 3d.; 1842, 2s. 3d.; 1843, 2s. 5d.; 1844, 2s. 4d.; 1845, 2s.; 1846, 1s. 10d.; 1847, 2s. 11d; 1848, 2s. 1d.; 1849, 2s. 5d.; 1850, 2s. 2d.; 1851, 2s. 1d.; 1852, 1s. 10½d.; 1853, 2s. 0½d.; 1854, 2s. 4d.; 1855, 2s. 8d. The highway rate, in 1838, was 2s. 2d. in 1*l.*; 1839, 2s. 4d.; 1840 to 1843, 1s. 8d.; 1844, 1s. 9d.; 1845, 2s. 4d.; 1846, 1s. 4d.; 1847, 1s.; 1848, 6d.; 1849, 6d.; 1850, 7d.; 1851, 6d.; 1852, 6d.; 1858, 8d.; 1854. 1s. 3d.; 1855, 10d. According to these figures, it would be seen that the rates had not increased since the mines have been discovered, but have, on the average, decreased. The average amount collected in the 1*l.* for poor-rates, for seven years, ending 1843, was 2s. 6¾d.; for seven years, ending 1855, 2s. 3d. in 1*l.*; showing a saving of 3¾d. in 1*l.* In the highway rate this is more apparent. The average for seven years, ending 1844, is 1s. 10d.; and for seven years, ending 1855, only 8¼d. in 1*l.*, being a decrease of 1s. 1¾d. in 1*l.* Notwithstanding the increase of population, which, according to the census of 1841, was 1412 against 2343 in 1851, which gives an increase, in ten years, of 931. West Caradon paid from the doctor and club fund, in 1852-3, 191*l.* 13s. 6d.; 1853-4, 179*l.* 16s.; 1854-5, 143*l.* 16s. 6d.; 1855-6, 144*l.* 10s 4d.; giving a total of 659*l.* 16s. 3d. paid by the West Caradon adventurers to the relief of the miners in the town of St. Cleer, in four years, ending Midsummer, 1856. The Church town of St. Cleer, which formerly, in 1835, consisted of a few labourers' cottages and poorhouse for reception of the poor, is now a village of considerable importance, and numbering a great many dwellings, grocers, and drapers' shops, and can boast of its post-office, and of a market-day, held on Fridays. There are, besides, two other villages lages sprung up at Crow's Nest and Tremar, which also boasted of good dwelling-houses and shops. Two bullocks are killed weekly in the parish, besides sheep, &c. The greater portion, however, of the inhabitants attend the Liskeard market. The average decrease of the rate, in the seven years ending 1855, was 3¾d. on the poor, and 1s. 1¾d. on the highway, rate. In the first period, ending in 1843, St. Cleer was not considered a mining parish. To show the extent of benefit received from mining in this district, he would mention that West Caradon, in the fifteen years from its commencement, had expended in labour 246,700*l.* 6s. 11d., and in materials, coal. timber, iron, &c., 104,682*l.* 8s. 5d. The amount of wages paid to labourers at the West Caradon, Gonamena, and Craddock Moor, in the parish of St. Cleer, of which Mr. Crouch was purser, is about 2500*l.* per month; South Caradon paid about 1800*l.* per month, and other smaller mines 500*l.*, making together 4800*l.*, or 1200*l.* per week. In Menheniot, the amount of wages paid at Mary Ann Mine per month is 1000*l.*; Wheal Trelawny, 1080*l.*, and Trewetha, 350*l.*—together, 2430*l.* per month. The general statement of the parish of Linkinghorne of the poor-rate showed that the rate from Lady-day, 1842-3, was, 2s. 10d.; 1843-4, 2s. 8d.; 1844-5, 2s. 10d.; 1845-6, 2s. 6d.; 1846-7, 2s. 11d.; 1847-8, 3s. 7d.; 1848-9, 3s. 4d.; 1849-50, 2s. 8d.; 1850-1, 3s. 6d.; 1851-2, 3s. 3d.; 1852-3, 2s. 4d.; 1853-4, 2s. 4d.; 1854-5, 2s. 4d.; 1855-6, 2s. 3d., showing a decrease in the amount of rating. There had been in that time an increase in the average rate of assessment. The number of cottages, in 1842, assessed at an average of 1*l.*, were 95; in 1855, 160 at 2*l.*, and, in 1856, 280, at an average of 3*l.*, although all have taken the benefit of compounding. This increase he attributed to the mining adventures entirely. In the borough of Liskeard the average amount of the poor-rate for the seven years ending Lady-day, 1841, was about 3s. 9d. in the 1*l.*; whilst in the seven years ending Lady-day, 1856, the average was 2s. 10d., showing a decrease of 11d. in the 1*l.* A rate at 1d. in the 1*l.* will realise about 30*l.*; and this decrease, therefore, would show a saving of about 330*l.* per annum. The gross estimated rental in 1835 was 4768*l.*, the ratable value in the same year 2682*l.* The gross estimated rental in 1856 is 9440*l.* 7s. 6d., and its ratable value 6949*l.* 13s. 2d. There could be no doubt of the fact that property in Liskeard borough had doubled since 1835 in value. There were scarcely any mines in the parish, but it was surrounded by them in St. Cleer, St. Ives, and Menheniot; but the decrease in the rates was attributable to the mines. The rate has been revised, but there has not been a general valuation since 1835. The population in 1841 was 3002, and in 1851, 4386, giving an increase of 1384. There was also a proportionate increase in the consumption in that period. The number of bullocks killed and brought to Liskeard in 1835 were 6½ per week. In 1856, the average number per week is 34; sheep and pigs have likewise increased in the same ratio; the present number of sheep killed being about 50 a week.

By the Committee—The effect of the stoppage of the mines would not be felt as a burthen, as the miners would find their way off to some other district. As to a general depression of mines, it was an event which had never occurred. Some of the guardians of their parish were opposed to the rating of mines; others were in favour of the rate. He had attended both the meetings at Truro. Capital to the amount of fully 1,000,000*l.*, was represented at the last. It was, with one exception (Mr. Darke, of Penzance, the drawer of the bill), unanimously of opinion that mines should not be rated.

By the Chairman—The doctor and club allowance continued until the man was enabled to resume his work, or the mine was abandoned. At the Phœnix Mines they commenced their club on a small scale in 1846. The receipts that year were 10*l.* 11s. 6d., and the expenditure 3*l.* 16s. 6d. In 1847, the receipts, 18*l.* 3s., and the payments, 11*l.* 15s. In 1848, receipts, 20*l.* 12s. 6d.; payments, 9*l.* 17s. 6d. In 1849, receipts, 23*l.* 11s.; payments, 15*l.* 5s. In 1850, the subscriptions rose to 53*l.* 14s., and the disbursements, 22*l.* 16s. In 1851, receipts, 73*l.* 13s.; disbursements, 22*l.* 16s. In 1852, the receipts were, 94*l.* 10s. 9d.; the payments, 89*l.* 17s. 2d. In 1853, receipts, 118*l.* 8d.; payments, 119*l.* 3s. 2d. In 1854, receipts, 124*l.* 0s. 6d.; payments, 91*l.* 10s. 10d. In 1855, receipts, 136*l.* 13s.; payments, 113*l.* 10s. 6d., making the total receipts for ten years from this source 673*l.* 17s. 3d., and the payments 556*l.* 9s. 10d., and leaving a cash balance of 118*l.* 7s. 5d. The allowances included surgeon in sickness. Many miners were also connected with benefit societies, from which they received in sickness certain advantages. He did not think that mines did any injury to the agriculturists, and they ought not to be taxed. Most of the capital expended in them came from London, but there were no labourers sent with it. If mine adventurers at a distance sunk 100,000*l.* in a district, he could not conceive that they ought to be taxed. Whenever a new mine was opened the population to work it came from parishes in the county. The club fund was supported by voluntary contributions. It was not in the nature of a friendly society. The miner knew by the rules of the mine that he was entitled to relief from the club so long as he is incapable of working. At the Phœnix Mine, about a fortnight since, two working miners met with injuries through premature blasting, by which one became totally and the other partially blind; and as long as he lived he would receive relief. It was the practice of miners to make some provision against age or accident. This was especially the case among tributers, whose pitches often turned out better than they expected; and he had known one who got so much as 200*l.* as his share in two months. The first thing he did, when he got his money, was to obtain a piece of ground, and by building on it was the means of increasing the towns and villages. He had not given any attention to the subject as to whether the area of settlement should be extended. They kept a separate book for the doctor and club, and had now a surplus balance of 118*l.* 7s. 5d. If the mine were abandoned they would continue to pay. There were variations in different mines as to this point, but it was their intention to continue the payments. He was not aware than when a mine broke up, the balance was carried to the adventurers if there were men on the club.

By the Committee—There was a great difference in mines giving employment to the poor of the county, without importing a number of poor into Cornwall to work them. Liskeard was a large town, and some miners resided there. A few of the mine agents had built houses in the town. The houses now built were better than before; but a considerable portion of them were built by the general inhabitants of Liskeard. The business of the town had greatly increased, and there were shops in it now with plate-glass fronts, which could scarcely boast of a square of glass a few years ago. He believed a petition had been presented from the guardians of Liskeard in favour of the rate, which was carried by a majority of only one. The parish of St. Cleer was newly valued for rating purposes in 1854 by Mr. Badcock, a land surveyor. The gross estimated rental of the new rate was 7179*l.* 0s. 4d., and its ratable value, 5309*l.* 17s. 8d. The gross rental of the old rate in 1837 was 5221*l.* 19s. 4d., and its rateable value 3916*l.* 9s. 6d., showing an increase on the rental of 1957*l.* 1s., and of 1393*l.* 8s. 2d. on the ratable value.

Mr. R. Taylor, farmer and lime-burner, at Liskeard, said he resided at St. Cleer. Among the mines in the parish were South Caradon, West Caradon, Gonamena, and Craddock Moor. None of these pay poor-rates. South Caradon was rated in 1838, and continued to pay rates until Jan., 1843, when the adventurers objected to pay, and obtained a new deed, with the dues reserved in money. After this Mr. Morris, the lord, agreed with the parishioners to make a payment in lieu of rates. The annual payment was to be 150*l.* This they received for two or three years, when it was reduced to 100*l.*, and subsequently continued to decline, until it was reduced to 40*l.* In 1849, the parish authorities waited on Mr. Morris, for the purpose of obtaining an increase, but he would not consent, and they determined to rate the mines, and the case was taken to the Quarter Session; but though it was proposed to compromise the matter, nothing was done. He did not know the amount of ore sold by this mine, but should say the profits were about 80,000*l.* The lord received about 2400*l.* per year for his dues. West Caradon paid rates from 1840 to last year, when they were discontinued. They paid until the meeting at Truro, which Mr. Crouch, the purser, attended. Since that they had ceased to pay. The meeting was in favour of rating mines, with the dues as the basis. He did not know Mr. Crouch's views, but thought he was opposed to rating. After they declined to pay the rates, he understood a new sett was made, in which the lord had a share. He considered that mines were a great evil to the farmers in the neighbourhood in which they were situated. A friend of his valued his farm as worth 50*l.* a-year less now than prior to mining, because his orchard was robbed. The mining absorbed about one-third of the weekly parish pay. Out of 6*l.* 9s. 4d. paid in a week 2*l.* 5s. 1d. was received by miners. Independent of that, it cost them a considerable sum yearly for the removal of the mining poor. Their attorney's bill averaged about 50*l.* per year, and one year the entire of it was paid for this purpose alone. He had spoken to one of the South Caradon miners respecting the doctor and club, who assured him that allowance was not made to the sick, but only in case of accident. He was a guardian of the poor many years ago, but was superannuated now. He did not think that the farmer received the slightest benefit from the mines, as the prices were governed by the Devonport and other large markets. In St. Cleer, the miller, butcher, and general shopkeeper were benefited. He considered it a great hardship that mines were excluded. The miners themselves complained, as they built houses, and had to borrow money, which they had to pay in a certain time; and they were frequently inclined to sell their property. They took leases for 99 and 66 years. No doubt in some cases the farmers were benefited when carts were employed, but generally they gained nothing, and were very much annoyed. The miners were a very independent set, and thought they had a right to go over any ones ground. They were the greatest evil to the farmer in the centre of a mining district. The farmers generally felt much aggrieved that mines did not pay rates. He believed every farmer in the parish would sign a petition in favour of mines paying rates. The working miners suffered themselves in having to pay the rates, and those in St. Cleer were truly sensible of it. He knew two who refused to sign the petition from South Caradon against rating. He considered mining to be a curse to the farmer in the centre of a mining district. Had granted setts, and was tolerably well acquainted with mining. Thought his dues were reserved in money, but did not interfere, however, but left that to the lawyer. He had never received any dues, or should have been glad to pay a rate on them. He had received a benefit from mines by carrying their produce on the canal, but not as a farmer. The ore at South Caradon was carried by rail, and the principal mines had railways running up to them. As to rating, he would impose it upon the lord. With regard to existing leases, it would only be fair to the county that some one should pay. If setts were taken by adventurers, with the understanding that they should pay, they ought, as the mining population were an expense to the ratepayers.

SEVENTH DAY—Tuesday, July 8.

The Committee resumed the examination of witnesses. The evidence of Mr. Sawle, M.P. for Bodmin; and Mr. Boger, of Devonport, concluded the case of Cornwall and Devon, and that from Derbyshire was commenced.

Mr. Sawle, M.P. for Bodmin, stated that he resided in Cornwall, was a Cornish magistrate, and Chairman of the Quarter Session. Now lived at Bodmin, but formerly resided in St Austell. Whilst there, acted as a magistrate of the district, and was now a magistrate at Bodmin. He had great experience in the large mining district. He knew the Restormal Iron Mine. It was a very large one, and about a quarter of a mile from his house. A great number of accidents happened at the mine in consequence of the frequency of what are called "runs." He had heard the evidence given to the effect that the clubs paid the expenses, and heard the statement with a great deal of surprise, as he knew that in Lanlivery district miners have large families, and they were thrown upon the parish. The mine was formerly rated, but did not continue the rate, and, knowing they could not compel them to pay, they attempted to rate the railway, but the proceedings were quashed. He knew, as a visitor to the Bodmin Union, that many miners' wives and families applied to the parish for assistance. He recollected perfectly well that there was a large number of miners, when the mines were stopped, in 1847, owing to a great scarcity, and a diminution in the price of iron, who were thrown upon the Union, and it became a serious question whether or not they would have to take them into the Union. A loan was applied for to relieve them, which was never repaid, and the whole of the burthen fell upon the parish. He thought that the opinion of Professor Smyth on this subject was based upon a want of experience in the district, as he presumed he merely visited it occasionally. When application was made to the Union, they attempted to ascertain the amount of the club money before giving relief, and it was never found in Lanlivery to meet the requirements of the poor miners; and he was certain this parish would be much better without the mines than with them. His experience of St. Austell was the same. Whenever there was any depreciation, or when tributers took bad pitches, they were constantly applying to the parish. So when the miner left to seek work elsewhere, his wife and family remained, and the parish had to support them. With regard to the agriculturist, there was no doubt he reaped a benefit when mines were in full operation, but when there was any depeciation he suffered considerably.

By the Chairman—His opinion was that dues ought to be rated. His father's setts were formerly reserved in kind. With regard to Fowey Consols, he thought a recent change had taken place, and that the dues were now reserved in money, but could not say positively. He did not see why mines should not be rated; and in rating them he went on the principle that the landlord who received the dues was the occupier, whether reserved in money or kind; therefore, he would rate the

ord, not the adventurer. In his own mind, he could not conceive why the royalty should not be rated. The mine he had spoken of had caused a great deal of pauperism, and he should say it had done so since the famine. He had heard some of the evidence with respect to the parish of St. Ann; there a great deal of common land had been built upon by cottagers, and when the mines were active they were very happy. There were about 2000 in St. Austell whose assessments were under 5*l.*; and he had sat on the bench when from 300 to 400 were summoned for the non-payment of rates. He considered that the rates in agricultural parishes were lower than the mining. The hundred was altogether lower than any in the kingdom. Still mines brought their bitters as well as their sweets. It was true the miners were a migratory population, but he was sorry to say that they too often left their families behind them, not certainly for any time, but some of them went to Cuba, Australia, and other parts, and then their families were a burthen for months, and even years, together. It was an exceedingly difficult matter to ketch the miners, as many of them went to Wales. Those who emigrated were constantly returning.

By the CHAIRMAN—He would only rate the dues. If they took the question of rating profits they would then have to go to the growing crops, cattle, and other produce.

Mr. BOGER, of Devonport, said he was a resident in Cornwall, had mining property of his own, and represented very large property for other parties in Cornwall and Devon. The mines with which he was connected were among the most profitable in both counties, and were making large returns. He was not prepared to state the value of the property he represented, as it was so very large. He had had the control of it for thirty years, and there was no deed of any kind executed that he did not look through. The number of leases granted were to the extent of several hundreds. For years scarcely a week passed without their receiving applications for leases, but he did not say they were all granted. After the granting of a lease he was in constant communication with the parties to it, and, as far as experience went, he was in a position to give an opinion on the subject of rating. Some twenty years ago some alterations were made with respect to the clause for evading the poor-rate, by which the lord not only reserved the dues entirely clear and exempt from rating charges, but the leases contained a covenant, on the part of the miner, that he would pay all taxes charged; the reservation was not only free and clear, but the lessee was bound to pay any taxes which might hereafter arise. In drawing these setts he did not find parties cavil, or make any objection to the clause, and he only knew of two instances in which it was proposed to alter the reservation of dues. However, the reservation was made, he considered the lessee would stand in the same position, in consequence of the clause in the leases. He considered that the rating of mines would not have the slightest effect either on legitimate or illegitimate speculation. He based this opinion upon calculations, and considered that the increase of the rate would be something less than 1d. per ton upon the ore raised. He assumed that the poor-rate was 2s. 6d. in 1*l.*, and that the average price of copper was 6*l.* per ton, the dues upon which were 1-15th, or 8s. per ton. Mr. Boger here entered into a complex calculation, the items of which we could not catch, but by which he attempted to show that the poor-rate, upon the above basis, would not exceed 1d. in 1*l.*, and contended that no rate of dues would affect legitimate mining, as they would be so small in calculating the contribution to the rate. He was acquainted with some of the largest mines, and considered that when mines ceased to work the burthen was very heavy. Taking the three largest districts, he did not think the rentals were increased by working the mines. There was very little difference in the rates when the mines were at work. He could illustrate the manner in which they were affected. In the parish of Beerferris, the legal expenses for removals amounted to about 3*l.* per head, and the mines did not pay to the maintenance of the poor. Therefore, the ratepayers considered it a very great hardship on them. The agriculturists, as a body, were not anxious to have mines in their neighbourhood. The farmers were only benefited to the extent of saving the amount of carriage of the produce to market, as the commons being built upon, it was consumed by the occupiers. The parishioners were the ratepayers and not the miners, and it was unfair that they should support the mining poor, as the amount of benefit received by them was so small that it had no relation to the poverty. He considered that the lessee of the mine ought to pay the rate, because the lord rated the occupier and not the landlord. In existing contracts he would divide the charge between the lessee and the lessor, on the same principle as in Ireland. With regard to the removal of the poor, the expense was not confined to the removal alone, but extended to other charges. The average sickness of miners, as compared with other inhabitants, was as 3 to 1, and in accidents as 2 to 1. The clubs contributed to miners in case of accident, and not for the wear and tear of the system; and it must not be forgotten that miners were subject to a disease something like consumption, which was called the miners' disease.

By the CHAIRMAN—The property he represented comprised Tamar Mines, East Tamar, South Tamar, Tavy Consols, Bottle Hill, Wheal Sidney, Wheal Friendship, Wheal Jewel, Old Wheal Jewel, Combe Martin Consols, in Devon; and Par Consols, Polgooth, Crinnis, South Crinnis, Wheal Regent, Treviskey, Carvannall, and Ting Tang, in Cornwall. Also interested in Wheal Exmouth and Adams, Porkellis United, Par Consols, and Treviskey. He never had but one share in a mine as an adventurer. He was aware that mining was attended with great cost and hazard, and that they employed the labouring poor extensively. In his experience the rates of parishes had not materially decreased. There was no appreciable difference. Mr. Boger was further examined by the committee, at some length, on the character and habits of the working miners, whom he characterised as a very intelligent and religiously disposed body. In reference to taxing timber, he said that he thought the succession-duty was a sufficient burthen on that. He thought the adventurer should be rated in conformity with the law of England. Whilst, on the other hand, it would be exceedingly difficult to find the owner of the dues in some cases. He knew that in Par Consols the purser held 1700*l.* in dues, in consequence of the difficulty, owing to some dispute, of finding the lord. In the course of his examination, Mr. Boger was cross-questioned on the calculation he made in reference to the amount per ton paid towards the rate; and as it was deemed an important point, and there appeared some mistake in it, it was thought advisable to recall Capt. S. Seccombe, to elucidate it.

Capt. S. SECCOMBE said he had heard Mr. Boger's calculation and immediately saw the fallacy of it—which consisted in dividing twice instead of once. He had made a calculation: the average price of copper ore for the last 20 years was 5*l.* per ton. Assuming the dues at 1-15th, or 6s. 8d. in the 1*l.*, and the rate to be 2s. 6d. in the 1*l.*, it would give a rate of 10d. per ton on all ore sold, if the rate is made upon all ores raised. The Great Devon Consols afforded a practical illustration of this: last year they sold 24,000 tons of ore, upon which they paid poor-rates to the amount of 1200*l.*, which was exactly 1s. in the 1*l.*, their dues being 1-12th.

Capt. SECCOMBE then withdrew; and at a subsequent stage of the proceedings, Mr. Boger asked permission of the committee to amend his evidence on this point, which he had since found to be erroneous.

The examination was then resumed.

Sir J. PAXTON said he resided in Derbyshire, and was agent to the Duke of Devonshire. The mining district of Derbyshire comprised the Peak, the High Peak, and the other districts of the King's Fields. The Duke of Devonshire was lessee of the part of the Peak and the High Peak. His Grace and Mr. Arkwright were the chief mineral owners. The whole of the mines were rated to the poor, the highway, and the tithes; but the rating depended upon the will of the lessor. The amount of the royalties taken was according to the district, and in nine cases out of ten, or ninety-nine out of a hundred, the miners petitioned the Duke of Devonshire to lower their dues. In almost every case in the High Peak and Peak deductions were made to the amount of one-third of the royalty. The same with the tithes. Were the full tithes taken they would amount to as much as the royalty. In some parts the royalty was 1-13th, in others, more. He was quite sure that the bill brought in by the honourable gentlemen had caused a great deal of alarm in Derbyshire, where the system of rating was entirely different from that of Cornwall. There were a few mines in Derbyshire held by large companies, but the greater portion of them were worked by a few—generally from one to three miners. They worked at the mines in the winter, and in the summer devoted themselves to agricultural pursuits; so that instead of becoming a burthen on the parish in winter, they were seeking employment in mining. He had never heard a word on the part of the landowners that they wished the mines should be rated to the poor—not from a single individual, nor that the occupier should be rated instead of the owner. He knew from the returns of the bar-master, for the last 20 years, that there had been much more money expended in their district than had been taken out of it. The customs of Derbyshire were very different to those in Cornwall. They did not grant leases in Derbyshire, but the miners could go wherever they liked to search for ore. The bar-master was appointed to see to the dues and carry out the customs, and his duty was to see that justice was done to the lord and the miner. When the miner took possession of a piece of ground there was a singular custom observed, which he did not quite understand. He had to mark the ground, and send for the bar-master, and give him notice of his intention; but this would be fully detailed by the witness. With regard to mines that had been given up, there were now very few who applied to work them again. Formerly it used to be a very easy process, but by the bill introduced in 1851, two of the jury should attend with the bar-master to inspect the district. Under the old custom, to re-open a mine the expense was about 3*l.*, and now it was 7*l.*, and from 1851 to 1856 there was not a single instance of persons applying to work old mines, and he believed that this extra 4*l.* had been the means of deterring the miner from applying. In his opinion nothing could more strongly show the danger of rating the mines, as in some parishes there were from 60 to 70 mines which were generally worked by poor men. In Bradwell, the mining population consisted of about three-fourths of the inhabitants. The proportion of the mining population in the Peak was about one-half of the inhabitants; they were not short lived, as they were out of doors a great deal in the summer. He did not consider they were a burden to the parish, neither did he see how the rate could be collected in Derbyshire unless they were subject to leases, as in Cornwall. In Derbyshire the mines ran through various parishes, and he thought it an impossibility to rate them. His opinion was that it would never do to interfere with the miner, and he considered it would be wrong in principle to do so. He knew of a mine where 30,000*l.* had been spent in three adventures, and he was satisfied that they had never taken 1000*l.* out of it. The only men who did any good in Derbyshire were the small miners, and the difficulty would be in collecting the rate from them. Refering to the statute of Elizabeth, he found that every occupier of lands, tithes, coal mines, and saleable underwood, were liable to the poor-rates, and he apprehended it meant what was stated. If they began rating lead mines they must go on to an indefinite extent, and must extend the principle to mortgages, brokers, bankers' profits, bricks, gas-works, &c. He looked upon the attempt to rate mines as beginning at the wrong end, and thought they should let the mines alone. He did not object to the principle of rating in Derbyshire, but then it was in a particular way. They were rated for 80 years, and the grantor paid the rates, and if they were now charged upon the miner they would materially injure the mining interest. In his opinion it was practically difficult to get at the adventurer, and could not do so without establishing an entire new machinery, because the miner in Derbyshire had a right to take up land wherever he pleased. Before taking possession he had to go to the bar-master. He thought it very dangerous to interfere with the present position of the miner. The amount of dues was fixed by agreement between the miner and the lessor; it was sometime 1-13th or 1-15th, and at others 1-20th. He saw no objection to this, as it had always worked well. In Derbyshire it was the custom to follow a vein wherever it went, and in many instances they followed it through different parishes. Very frequently veins were now being worked on within 10 yards of each other, and sometimes terrible fights ensued when intersected by different parties.

By the CHAIRMAN—Any body could open a mine any where they pleased, and had only to buy a pick and shovel to begin. They had the power to go in front of your house and dig, but they must go to the bar-master. It was, however, a very rare occurrence that anything of the kind was done. The mining population were a very quiet race of people, and had no disposition to annoy others. Although they had the power they really did not use it. To his knowledge, there were only seven mines out of hundreds in the district that were paying. He could not tell the depth at which mines were worked. The veins ran through several parishes, and the rates are paid to the parish in which the shaft is situated on the ore brought to surface. It would be very difficult to rate to all parishes, as the veins undulated. The system was really one of giving and taking. The extent of the workings is generally a matter of much mystification.

Mr. HUBBERSTY, of Wirksworth, said he was a solicitor and mine proprietor at Wirksworth, and had been engaged professionally in mining matters in Derbyshire. He was acquainted with the mineral customs of the county, which went back to a very ancient date. Previous to 1851 the mines in the High Peak were governed by ancient customs, which prevailed in the district. In that year an Act was obtained so as to bring them within the statute law. In 1852 he was instructed by the miners of Wirksworth to make that legal which had previously been custom, and an Act for that purpose was obtained. Mr. Hubberstey then recited the preamble of the Act, and entered into interesting particulars as to the antiquity and peculiarity of the mining customs and mineral rights of the Wapentake of Wirksworth, describing the mode of taking and freeing the meer, and the payment of lot and cope.* The ceremony of the dish, whose standard was fixed by the brazen dish presented by the Earl of Shrewsbury in the reign of Henry the Eighth, and now in the Moote Hall of Wirksworth. The Act provided, that should this be lost at any time all future dishes should be equal to, as now, 15 pints of water. The dish varied in Wirksworth and the High Peak. He stated that since the case of Rolls v. Jell the dues were reserved in kind, and that the only exception to this was a mine in Wadebridge, in which the mineral land belonged to Mr. Nightingale, when, about 20 years ago, advantage was taken of money payment to avoid the rate. In the adjoining manor the dues were reserved in kind. With that one exception all dues were rated to the poor and highway. In Bradwill, the mines pay tithes, as also in the High Peak. The dues are rated in Wirksworth on the same principle as house property. Mr. Hubberstey expressed his concurrence in the opinion of Sir Joseph Paxton, that there would be great difficulty in collecting the rate. He believed the rates would not be collected, as the sympathies of the people would be with the miner, and not with the lord. He had a return of the number of miners at work, and on the average there were not more than three employed in a mine. There were a great many small mines worked, in which there could be no beneficial occupation. Though the mines were poor a considerable amount of lead had been raised, more so than in Cornwall. According to the parliamentary returns, the lead ore raised in 1854 in Cornwall amounted to 7460 tons, and in Derbyshire to 7554 tons. The Derbyshire was not quite so much in 1855; it consisted of 8524 tons, against 8952 tons in Cornwall. In Wirksworth there was a mixed population, mining, agricultural, and manufacturing. The rates last year were 3s. in 1*l.* The number of paupers was 78; of these only two were miners, and eleven widows and orphans of miners. The fact was, that the lead miners were very independent, and would work on any chance rather than go to the parish. If the rate were thrown upon the miners it would have the effect of preventing them from working. He did not disagree with the principle of rating, but there was a great distinction between rating the dues and rating the mine. He would rate the lord on his dues, and not rate the mine at all. If allowed to refer to the bill, then the miner was rated as an occupier, and he did not object that dues and royalties should be rated to the poor, but he would not have the occupier rated.

Mr. R. BROMLEY, of Derby, land agent and surveyor, described the custom of rating coal mines in South Staffordshire. Had been in practice for 40 years, and was well acquainted with the mineral districts of Derbyshire, and never had any complaints as to the mode of rating. The landowners with whom he was connected were concerned in coal and lead mines. He was quite satisfied that mines in a district were decidedly a benefit to the neighbourhood, and that the lords, who were rated, cheerfully paid the rates. Coal mines were rated according to the probable value. This they easily ascertained, as they knew the produce per acre, and about the number of acres to be worked. They did not rate on the price of the coal, but the lessee was rated according to his rent, making a certain deduction. The rent was not exactly a royalty, but the coal was absolutely sold as at per acre. They calculated the rent according to the thickness of the seam; some were worth 200*l.* per acre, others 500*l.* The value depended upon the depth, and the cost of raising. The coal raised near the surface cost less than that from a depth. The lord did not reserve dues, but there was a certain small rent, so it was agreed to pay 100*l.* or 200*l.*; the lessee generally had to get a certain quantity, or pay for it. Coal was not like lead ore; they knew its quantity and its value. They were supposed to get a certain quantity in a year, and were bound to do so, and were rated on the same principle as other ratable property. If the lessee gets more than was expected, he pays for the difference.

At the conclusion of Mr. Bromley's evidence, the committee adjourned until Friday [The evidence taken yesterday will be found in another part of the Journal.]

## MINING RESOURCES OF IRELAND—COAL FIELDS.

A new era has commenced with the present proprietary changes of this beautiful country, and the light of science, whilst advancing the literary acquirements of the inhabitants, is also eliminating wealth from the elements of industry which slumber in the mine, and, at the same time, is creating new sources of employment.

Within but a very few years, several rich mineral districts have been searched and tested, and their treasures put into requisition; the geological societies, and more particularly that founded in the Dublin University, having done much in the onward progress, by stimulating not only Irishmen, but the more practical miners of England, to search the stores which Nature has deposited so abundantly in the neighbouring isle.

Prof. Haughton is now the great actuary of that science in the University; and, unlike theorists of former times, he avails himself of the skill gained by the class of men who, instructed by laborious practice, have attained knowledge in those secrets of Nature that are "hidden from the wise and prudent, but revealed unto" the simple.

The prefatory words of one of the rev. professor's lectures, may be here not inaptly cited:—

> Some geologists professed to undervalue the knowledge to be obtained from practical miners, simply because such persons were not accustomed to clothe their facts with the language used by theoretical geologists; and, on the other hand, practical miners were accustomed to despise the aid derivable from theoretical geology, because geologists were not acquainted with the class of facts with which the practical miner is conversant from his earliest youth. The reconciliation of these two classes can only be effected by each making itself better acquainted with the facts know to the other, and can never be accomplished, either by pretending to a knowledge we do not possess, or by despising the knowledge possessed by others. When the theoretical geologist enters a mine, quarry, or coal-pit, he should do so as a learner, and not as a teacher, and should be ready to admit that intelligent men, who have spent their lives, and made their fortunes, by sinking shafts and driving levels, are likely to know more of such matters than an amateur. On the other hand, the practical miner must, and does, derive much useful information from the scientific geologist, and would derive much more if the two classes understood each others language better.

For some years prior to 1848, Prof. Kane, M.D., since then Sir Robert Kane, was the able expounder of geological as well as of chemical science in the City of Dublin; and was accredited by the highest authorities there as lecturer in those arts.

A work of his, published by Murray, Grafton-street, Dublin, in 1845, shows the extent to which mining ventures were then carried on, and demonstrates how far the discoveries of the mineral properties of that part of the United Kingdom were then understood.

As to coal, the great and indispensable staple of manufacture, a few extracts may suffice for this purpose:—

> In other countries it has been the most anxious care of Government to ascertain the nature and the amount of their means of promoting industry and extending the employment of the people, and it is thus that the continental nations make giant strides in manufacturing activity; if similar zeal and intelligence were manifested in developing the resources of Ireland, there would be no fear of the result.
>
> I know that all that is sound and permanent in England's industrial power grow, not out of oratorical elegancies, but from hard-handed, stern, and persevering work.
>
> Four maps of Ireland were published, distinguishing—1. The geological structure; 2. Elevation of surface; 3. Distribution of bog and drainage; 4. Means of internal intercourse.

The necessity of fuel to the development of manufactures is obviously indicated by a reference to the map of England, in which the manufacturing districts mark, almost with geological accuracy, the limits of the coal fields.

The northern coal fields yield a bituminous, or flaming coal; those of the south only anthracite.

The deposit occupies the greater portion of the county of Kilkenny, the Queen's County, and parts of Carlow; and is bounded on the east, west, and south, by the two great rivers Barrow and Nore.

The Munster coal field, the most extensive in the British empire, occupies considerable portions of the counties of Clare, Limerick, Cork, and Kerry. The collieries at present in work, are the Rossmore and Drummagh, in the former range, and of Duhallow, in the county of Cork.

In Tyrone there is a small but highly-interesting coal field, containing rocks of every epoch, from granite to those tertiary clays which constitute the latest term of the geological series. The limestone of Dungannon may be considered as forming the base of the Tyrone coal district. This coal burns rapidly with flame, and evolves great heat. The linear dimensions of the Coal Island field are 6 miles by 2; its area about 7000 acres. The Anaghone district contains only 320 acres, as yet recognised.

From Mr. Griffiths's report, it appears that there are in this basin six workable beds of coal, as follows:—

| Bed of coal. | Thickness. |
|---|---|
| 1. Annagher coal | 8 ft. 0 in. to 10 ft. 0 in. |
| 2. Yard coal | 2 0 to 3 0 |
| 3. Brackareel | 4 9 to 5 0 |
| 4. Baltebay | 0 9 to 3 0 |
| 5. Derry | 4 6 to 5 0 |
| 6. Gortnaskea | 2 0 to 6 0 |

From 22 to 32 feet of solid coal are thus found within a depth of 120 fathoms; and it is remarked by Mr. Griffiths, that amongst the numberless English coal-pits there is no example of the same thickness within a like distance from the surface.

At the northern extremity of Antrim is found a coal district, at Mulvagh Bay; the beds are six in number, of which two are anthracitous and four bituminous. The quantity of coal in this district is small, but it appears to have been the oldest worked colliery in Ireland; as, during the year 1770, the miners broke into an old gallery, the walls whereof were lined with stalactites, evidently of great age, and miners' tools were found herein; no tradition of the country had ever been heard of respecting such works, therefore this period must have been very remote.

In Monaghan, also, a small coal field is known to exist, but the working is so difficult that it is considered valueless.

The largest river of the British Islands, the Shannon, falls into the Atlantic Ocean, dividing the counties of Clare and Kelly, and cutting through the centre of the Munster coal formation; expanding into a chain of extensive lakes, it intersects, throughout a chain of 247 miles, some of the richest lands of Ireland, visiting ten of her 32 counties; it has its source in the Leitrim Hills, where it springs with almost full powers from a vast gulf, the depth of which has not been yet ascertained, and, immediately expanding, forms Lough Allen, an area of 8900 acres.

Sir R. Kane describes the wild heather-clad mountains, and the desolate, though beautiful, aspect of this country, as deplorable; but not so much so as the condition of the wretched peasantry, who, in the year 1844, thronged around him, many looking out for employment. His presence there was a sort of phenomenon, and he could but deplore that he had not in his power the aid of industrial enterprise. He adds—"If the circumstances of this country were really known, such events as the jobbing of the Arigan Company could not have occurred!"

The beds of coal found in this district are three in number; the first bed, known by the name of Crow Coal, is of little value except for burning lime. On the 3-foot coal the future prosperity of the Connaught district may be said to depend; its quality as fuel for domestic purposes is excellent; and, if used for smelting iron, it is the best in the empire. According to the analysis of Kirwan, it consists of:—

| | |
|---|---|
| Carbon | 71·42 |
| Asphalt and maltha | 23·37 |
| Grey ashes | 5·21 |
| Specific gravity | 1·351 |

The thickness of this bed is rarely less than 3 feet, nor more than 3 feet 4 in. In its outgoing, at the iron-works, it may be traced for 4½ miles.

In the western division of this district there may be about 1200 acres of 3-foot coal, added to 2800 acres in the southern, this will give a general total of 5000 acres.

Several collieries are in work, the Rover and Aughabehy being the principal; being of a higher level than the surrounding country, these beds may be wrought under the most favourable circumstances.

The quantity raised annually from the Lough Allen district about the period Sir R. Kane describes (1844), was only 3000 tons! What a contrast this. The coal beds of a whole province, then, only partially worked, and producing no more than would suffice for the consumption of 375 houses, being about that of a small county town in England, containing 2250 inhabitants!

So much for the spirit of enterprise of that day. How do we now find it?—most certainly not advancing in this particular element of industry. Still, a progress is on foot, and the attention of men skilled in practical mining, of prospecters, Cornish captains, Scottish, and some few other speculators, is turned towards the too long-neglected fields of Ireland; and heartily do we wish success to undertakings which, in their action, must confer inestimable advantages upon the residents of the country, and in their result fortune upon the promoters.

There has been a prejudice with respect to the settlement of strangers in Ireland, which has had an evil influence on all projects of improvements, whether in agriculture, manufactures, or mines; that prejudice is now, happily, abated, if not extinct. It was dread for the insecurity of life and property.

The numerous settlements of English and Scotch proprietors and farmers in all the provinces, since the Incumbered Estates Act came into operation, the prosperity of the works carried on, and the complete security of all immigrants, testify sufficiently that life is as quiet and as enjoyable, and property as easy of attainment, and as secure when acquired, as it is in England. The calendars of the various assize towns show a much smaller amount of crime; at most of the assizes but very few cases have stood arraigned for trial, rarely any of a grave character; whilst many of them (as lately at Galway) were maiden! and the total absence of prosecutions for those enormities which have but too frequently stigmatised the national character in this great commercial country discover the fact, that if the Irish are lower in civilisation—in refinement—in wealth, even so are they less obnoxious to the charge that either life or property are imperilled amongst them.

There have been, it is true, some few acts of atrocity, arising either from agrarian conflicts (now, happily, almost obsolete), or from those sources of evil which have their origin in wealth, high refinement, and luxury—perhaps, in five years, there have been three of that description. But how does the reproachful shadow of even these horrors fade away before the deeper dye of enormities perpetrated within the pale of British jurisprudence at home? The whole world has from year to year been appalled at the record of criminal trials; may the fertile, beautiful, and, comparatively guiltless, Thule, ever remain unimproved and unsophisticated, rather than attain to wealth, fame, and power, at the expense of integrity and virtue!

In further remarks, the new mining enterprises and fresh-developed resources of Ireland shall be noticed.

## MINING IN IRELAND—THE MINES OF WICKLOW.*

We have often, in our Journal, referred to the mining districts of Wicklow, in Ireland; and our Dublin correspondent has afforded our readers, from time to time, all the current information on the subject. It is with great pleasure, however, that we welcome this most interesting little work, which gives a most full and, as far as we can judge, correct account of the lead and copper and sulphur districts of Wicklow, as a valuable addition to our mining literature.

The author commences by describing the position of the great granite range of Ireland, which extends from Dublin to Waterford:—

> "The great granite tract rises to its highest point in Lugnaquilla, in the county of Wicklow, which has an elevation of three thousand feet above the level of the sea. On the western side of the chain it extends itself out, and forms an extensive gigantic plateau, surrounded by the bold amphitheatre of hills and mountains, which stretch westward from the vicinity of Castle Dermot, past Baltinglass, towards Lugnaquilla, and thence spread to the south along the western brow of the Shillelagh hills. * * *
>
> Sedimentary formations of the lower Silurian and Cambrian age overlie this granite range on the east, and form a schistose band between it and the sea. The metamorphic action of the granite has been so intense along its line of junction with these deposits, that we find the ordinary blue and dark slates of the Silurian formation altered all along the edge of the granite into a dark grey micaceous schist, passing back, as we recede eastward the line of junction, generally within about half a mile, into slate rocks of the ordinary unaltered character."

The author then proceeds to point out the leading geological features of the eastern flank of this chain; the phenomena of the junction of the slate and granite; the peculiar development of quartz and quartzo-felspathic rocks; and the general connection of the districts.

> "The elevated granitic mountain chain which I have described, and the clay-slate tract overlying it on the east, are—particularly the former—in many parts of the county of Wicklow rich in metalliferous deposits. These were divided by Mr. Weaver—and most judiciously so—into two distinct districts, which differ from each other in almost every particular. The one district consists of lead mines in the granite, in which the ore is found, in the usual manner, in regular lodes or veins; and the other districts consist of the copper and sulphur mines of the Ovoca and Aughrim, in which the ores are deposited, in a peculiar and unusual manner, in what seems, for the most part, to be beds contemporaneous with the strata. * * * * *
>
> Of these [referring to the lead district], the only ones which are now profitably worked are the Luganure and Glenmalure mines; and to them, consequently, I will confine my remarks. As the two lead districts of Glenmalure and Luganure, as well as the copper district, all lie on the Ovoca and its tributaries, it will be convenient to describe them, by following up this river from the sea.
>
> The Ovoca falls into the sea at Arklow, the most populous town in the county of Wicklow, and from whose port the greater part of the produce of the Ovoca mines is shipped. The harbour has been built by the Wicklow Mine Company, under the authority of an Act obtained in the Irish Parliament before the Union; which also gives powers for the construction of a canal to the lead mines of Glenmalure, as well as to the neighbouring copper mines. The most striking work, however, connected with this town is the mineral railway made by Mr. Hodgson, for the use of his own mine, Ballygahan. This railway is of the best construction, and is eight miles in length. It does the greatest credit to the energy and enterprise of the proprietor, who is a veteran of Irish mining, and in every way worthy of his magnificent success at Ballygahan. Following up the waters of this stream, rendered turbid and poisonous by the numerous mines on its banks, we pass through the far-famed Vale of Ovoca, the sloping hills of which are crowned with shady woods, studded with noble mansions, among which Ballyraine House, the splendid and hospitable seat of Mr. Hodgson, is eminently conspicuous. The stream continues in a general straight line until we reach the wooden bridge, where it receives the waters of the Aughrim. The stream, as shown in the plan, drains the gold "washings" of Moneyteige, and then flows through the copper district of the Aughrim Valley, receiving near its junction with the Ovoca the stream called the "Gold Mines River," so named from passing through the old 'washings' of Ballinagore, Ballinvalley, and Killahurler. Following up the Ovoca from the wooden bridge, where it takes a bend to the right, we have the mineral railway and the high road on the left, and the beautiful woods of Ballyarthur, the picturesque village of Newbridge, and Cherrymount House on the right, until we arrive at the Ovoca Copper Mines."

The granite lead district of Glenmalure is first referred to, and next the Luganure lead district, belonging to the Mining Company of Ireland.

The following extracts refer to these two districts:—

> "After proceeding up the Avon-beg for about six miles from the "Meetings," the aspect of the country gradually becomes more wild and desolate, and the hills skirt-

* These customs have been referred to at various times in the Journal, and will be found fully and accurately set forth in Mr. T. Tapping's works on the "High Peak Mining Customs," the "Derbyshire Mining Customs," the second edition of "Manlove's Customs of the Wirksworth Lead Mines," and in his lecture on the "High Peak Mineral Customs and Mineral Courts Act, 1851."

* London: C. H. Law, Fleet-street; and the *Mining Journal* office, Fleet-street.

the stream begin to spring ruggedly and abruptly from the edge, rising, as we ll proceed, into lofty mountains. We are now in the wild glen or ravine, as it may r value, of Glenmalure, which runs nearly in a right line from north-west to south- t, for a length of about six miles from its summit to the old barrack of Drumgoff; ow which it continues in the same general direction back towards the 'Meeting of the Waters;' but becoming broaded and more sinuous, and losing that peculiar rine character which marks its upper portion with an unequalled wildness and traveler. The sides above the point where the old military road crosses the glen at rumgoff are steep, craggy, and bare; and this character extends to the end of the ten, to the left of which rises—generally lost in the mists—the lofty summit of ugnaquilla. Above Drumgoff, the glen is also characterised by the absence of any teral valleys opening into it, with one exception—an extremely wild and exquisitely autiful ravine, through which flows a stream, forming the drainage of the water ich falls on the southern slopes of Lugnaquilla. * * * * * *

The old Glenmalure Lead Mine is worked in the townland of Ballinafushogue [see ap], by Mr. Hodgson, of Ballygahan Mine, in the Ovoca; he holds it under lease m the Earl of Essex. The principal lode in this mine, indeed the only one of im- portance, strikes about south-east by south, crossing the valley at an acute angle, and intersecting the direction of the alterations of mica-slate and granite, above described, in an angle of about 65°. This lode has been opened upon for about 500 fathoms in length, but any serious mining operations have only extended for the short distance of about 150 fathoms. At the surface the underlie of the lode is south, but it soon changes to a northern dip, which brings the vein to the depth of the adit level (85 fa- thoms), perpendicular on the whole from the surface. Below the adit the dip con- tinues to the north. This lode is by far the largest of any other in the Wicklow gra- nite district, sometimes being as much as 20 ft. wide. In it three or four bands of materials may be always found, one of which is invariably without ore, and is com- posed of the debris of the rock through which the lode is passing at that place. * *

In the townland of Cullentragh-park, belonging to the Earl of Meath, immediately adjoining Ballinafunshogue on the west, some workings have been made in, and some ore raised from, a lode which crops out high up on the hill, and bears about 20° west of north. * * * * * *

Facing Cullentragh-park, on the south side of the valley, three veins have been opened on, all of which are characterised by a greater or less abundance of barytes, a considerable quantity of which has been raised and shipped, although, as the works are now stopped, probably not in sufficient quantity to pay the cost of working. The quality of the barytes is good. These veins also present promising indications for lead. * * * * * *

On the same side of the valley, but higher up, is Barravore, where a fine strong and promising lode, having the same bearing as, and supposed to be a continuation of the Ballinafunshogue lode, has been worked upon to a considerable extent. This mine has been lately abandoned; and the parties who were working it are now work- ing on the opposite side of the valley, at Ballygoneen, which, as will be seen by the map, adjoins Cullentragh-park on the west. Banavore and Ballygoneen are, like Cullentragh-park, entirely in the fundamental granite.

Instead of returning to the 'Meetings,' and following up the winding course of the Avonmore for many miles, we will cross from Glenmalure to the north, over the Lugdoff mountain, and arrive at once at its source in the mountain lakes. After passing the summit of Lugdoff, we find ourselves immediately overlooking the sub- lime scenery of the valley of Glendalough. In viewing this glen from its head to the top of the waterfall, which is not less than 600 ft. above the lake, the eye takes in at a glance its whole compass, with its abrupt precipitous sides, the upper and part of the lower lake, with the hill of Castle Kevin beyond. It constitutes a stupendous excavation from a thousand to twelve hundred yards in width, and in length between two and three miles, with precipices on either hand rising a thousand feet in height; while at the head of the glen, the granite closes in the whole with lofty precipices.

To the north of the Glendalough valley rises the Comadery mountain, which attains an elevation of 2296 feet above the level of the sea. If we cross over this mountain we arrive at the valley of Glendasane, in which the principal Luganure mines are situated, and which, although not so imposing as Glendalough, is still wild and mag- nificent. At the head of this glen, and at the great elevation of 1384 feet above the level of the sea, is Lough Nahanagan, from which flows the Glendasane River with a rapid fall, affording great facilities for working machinery by water-power. This stream unites with the Glenealo, flowing from the Glendalough valley, just below the old ruins of the Seven Churches, and the Priory of St. Saviour, where the two valleys blend into one. * * * * * *

The Luganure Mines, which name applies to all those worked in the two valleys of Glendasane and Gendalough, are the property of the Mining Company of Ireland, and derive their name from that of one the numerous lodes worked in this district in the early part of the present century, under the direction of Mr. Weaver; and which has, after lying dormant for many years, been lately re-opened by the Mining Company of Ireland."

Chapter II. contains a most complete account—at once historical, geological, and practical,—of the Ovoca copper and sulphur district in the clay-slate. Ballymurtagh, Ballygahan, Cronebane, Tigrony, Connoree, and Ballymoncen are, in succession, de- scribed most vividly and vigorously; and a history of their working traced for the last hundred years. We cannot, by any extracts, do justice to this chapter, to which we must refer our readers themselves.

In the last chapter follows a most interesting description of the sulphur workings, and the uses to which the ore is applied; and also consideration as to the prospect of the unwrought part of the district. This little book is illustrated by several most characteristic wood cuts, and by five maps and sections of the mining districts of Wicklow,—the latter are most valuable, indeed indispensable to any one connected with, or interested in, any of the Wicklow mines.

The "Mines of Wicklow" are published anonymously, but we can only say that whoever the author may be—and he is evidently thoroughly conversant with his sub- ject—the mining public are indebted to him for his contribution to our knowledge of these interesting districts; and we hope that he will receive such encouragement as may induce him to proceed—as we understand his intention to be,—to place before the reading public popular, and yet correct, descriptions of our leading mining dis- tricts. The value of such a work, by a gentleman so well acquainted with his subject as the author of the "Mines of Wicklow," would be invaluable to the mining interest, by bringing their property more fully before the reading public. We shall again re- turn to this book; at present we can only strongly recommend it to our readers.

## LUNAR MOTION DEFINED.*

The discussion respecting the moon's movement has lately created great excitement and very animated arguments amongst our scientific men, both in England and on the Continent. This discussion has originated in a letter sent to the *Times*, from one of Her Majesty's Inspectors of Schools, Mr. Jelinger Symons, in which he maintained that the astronomers were wrong in stating that the moon rotated on her own axis. The non-rotation of the moon appears to us self-evident, from the description given by the astronomers themselves—viz., "The moon, in revolving about the earth, keeps the same face always towards us." This observed fact is admitted by all. But as- tronomers state that *because she does always present the same face* to us she *must* ro- tate on her own axis once a month, and that if she did show her whole body to us all round once a month she would then have no rotation. It is difficult to conceive how they arrive at these conclusions, which appear so opposite to the ordinary effects of rotation and revolution in terrestrial movements. However, as Mr. Symons, in his pamphlet, has fully entered into the merits of the argument, *pro* and *con*, and has rendered the question clear and free from all obscurities, and as our correspondent, Mr. Hopkins, has also maintained the same view as Mr. Symons, and has lately elu- cidated the question in the *Mining Journal*, we need not repeat many of the illustra- tions, but refer our readers to the pamphlet itself.

The notion of the moon's rotation must have originated in a misconception, and the confounding of the turning round by means of revolution with that of turning round by rotation. This error having been once accepted, and then established, is, like many other errors, obstinately retained by our mathematicians, simply on that account, in opposition to their better judgment, and to the laws of, and the terms employed in, the science of dynamics. It is very commonly remarked, that it is a singular fact that men who have been trained in the science of mathematics, from whom we have a right to expect a clear conception of what they undertake to instruct, and precise definition of all matters pertaining to that science, should be so often found the most confused, contradictory, and unintelligible in their arguments.† We are taught in dynamics that *rotation* simply means the act of turning round on an axis or centre, situated within the body. *Revolution* means the act of turning round on an axis or centre, situated *outside* of the body. Although both necessarily turn round, the two motions are yet quite distinct, and their respective centres of motion have definite positions—that is, the one *within* and the other *without*.

When we were informed that the Astronomer Royal had condescended to enter into this discussion, and had written two explanatory letters on the subject to Mr. Symons, we anticipated that such an eminent authority would have removed some of the ob- scurity which has caused the dispute; that he would not only employ the terms ro- tation and revolution strictly according to their true meaning, and confine himself within the circle of the moon, but also boldly enter into the dynamical merits of the question, showing how astronomers prove that the moon rotates.

We have been much disappointed. Professor Airy's letters appear to us somewhat incongruous and contradictory, and tend to envelop the points in dispute in increased darkness. We shall quote a few paragraphs that bear on the question. Mr. Symons requested the Astronomer Royal to give his opinion on the subject; the following is an extract from his first reply, dated Greenwich, April 19:—"Suppose that a body moving freely in space, whose motion is determined by the attraction of two (the sun and the earth), rotates. If we wish to determine either the fact or the velocity of its rotation, we must refer the direction of some produced radius of the body to some zero point. What shall that zero point be? The sun? Not at all. Ought it to be the earth? *A fortiori*, no. What, then, is it to be? Clearly the same which is the point of reference for all other rotations (*query*, revolutions)—viz., some point (as a star) at a distance so great that the motion of the moon in going round the sun does not sensibly disturb the direction of the line from the moon to the star."

It must be admitted that this is a strange way to determine whether the moon ro- tates or not. We need not observe that the question of rotation has nothing whatever to do with the attraction of the sun and the earth, nor yet with the annual motion of the moon round the sun, but simply, *does the moon turn round on an internal centre or not?* Surely, such a simple dynamical movement ought to be easily demonstrated, by referring only to the moon herself within the space of her monthly orbit, without bringing in the whole of the solar system, and the sidcrial regions besides.

The Astronomer Royal then proceeds:—"Having thus come to the point that rota- tion is to be referred to something very distant, as a star, and *not* to anything near, as the sun or earth, there is little difficulty in ascertaining from observable appear- ances whether the moon does or does not rotate. Does she always turn the same part of her face to the same star? No. Then she does rotate (*qy.* revolve). If her face has been once turned to a star, how long a time elapses before it is turned to the same star again? 27¼ days. Then, 27¼ days is the time of her rotation (*qy.* revolution)." This is an extraordinary mode of reasoning, by so high an authority as the Astro-

* "Lunar Motion: The whole argument stated, with Letters from the Astronomer Royal on the subject." By J. Symons, Esq., B.A. Price, 6d., 8vo. Groombridge and Sons, Paternoster-row.

† The "Moderators" of Cambridge have lately called the attention of the Mathe- matical Board to the following points:—"They complain at the want of giving defi- nitions and explanations of fundamental principles completely and fully. . . . . This remark applies more especially to elementary dynamics and astronomy; in both which subjects *the papers, even of the more distinguished of the candidates for honours, have frequently exhibited a want of clearness of conception, and of habits of close and accu- rate thought.* The course of examination for ordinary degrees are in too many cases merely got by rote, without being at all understood." A reformation in University training is much wanted, and it is gratifying to observe that such a reformation is now recommended in the right quarter. Mathematical students will before long cease to be deep in the calculus and the binomial theorem before they clearly under- stand the additions of two fractions, the common laws of mechanics, and the differ- ence between spinning round and moving round a centre.

nomer Royal. If the moon truly and simply revolves round the earth, she must, as a natural consequence, show different faces to the starry regions by her orbital motion. Had she continued to show the same face to the same star, she could not revolve, much less rotate. Prof. Airy must mean the moon's *revolution* in her monthly orbit. His explanations are totally irreconcilable with the simple action of rotation. The mere rotation of the moon has no relation whatever to space. Were the moon the only object seen in the heavens, her rotation or non-rotation could be ascertained with equal precision. Why, then, refer to the stars?

How do we determine whether the sun rotates or not? Do we refer to the stars, or any other distant objects? Certainly not. We simply observe the visible hemis- phere, and watch the black spots moving across the disk, and thus we find that the sun rotates, and that the period of that rotation is 25 days 7 hours 48 minutes. Had the dark patches seen on the moon moved across, like the black spots on the sun, we should then observe a motion resulting from her own axis—that is, rotation; but as the moon constantly presents the same face towards the centre of her orbit, she is equivalent to a body fixed in a ring, and therefore cannot rotate. Indeed, this is a self-evident proposition, and cannot be controverted.

All bodies that float on the ocean, in the air above, within the moon's orbit, that accompany the earth in its movements round the sun, are to all intents and purposes attached to it, although the connection may be invisible. And if such bodies in moving round the earth always present the same parts towards its centre, be those parts the keel of vessels, our feet, the feet of birds in flying, the clouds, or the face of the moon beyond, it is precisely the same thing; they cannot, under such condi- tions, rotate on axes parallel to the revolving axes.

The Astronomer Royal, in his second letter, May 5, fully confirms the impression that what he means by rotation (as far the moon is concerned) is her revolving mo- tion, inasmuch as he distinctly states that "every point in the moon's body does de- scribe a ring round the earth, that earth being a travelling centre." This shows plainly the effects of a revolving motion, but what are we to make of the following observation?—"Every point in the moon's body does also describe a ring round that axis of the moon which is perpendicular to the moon's orbit, that axis being a tra- velling axis." If this means rings of motion round an axis *in* the moon, it is in direct contradiction to the former statement; as it is utterly impossible that two such distinct circular actions of any given points on the moon could co-exist.

The Astronomer Royal very clearly states that, "with reference to the earth, the invisible half of the moon moves with the greatest velocity," as compared with the visible half. This agrees with her revolving motion, but unfortunately this is again neutralised by the following remark:—"With reference to the moon's centre, the two halves of the moon move with equal speed." How is it possible to reconcile this statement with the former? How can the inner portion of the segment of a circle travel at the same rate as the external part, or move at equal speed?

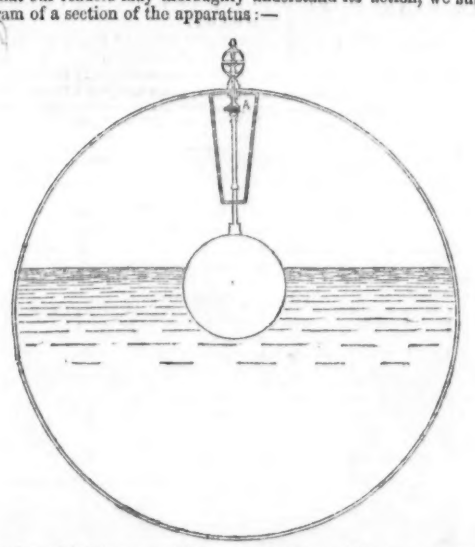
The Astronomer Royal then proceeds to state that "a body consisting of firmly con- nected parts, if it rotate at all round any centre whatever, *must* (by geometrical ne- cessity) so rotate that all points move in concentric rings relative to that centre, and the speed of each particle relative to that centre will be proportional to the distance from that centre. But this does not at all determine where that centre is." The centre of rotation must necessarily be within the circles, and in the body; it cannot be situ- ated without, because in that case the motion would be no longer rotation, but revo- lution, and consequently could not describe rings on the body; the rings must, therefore, determine the position of the centre. How, then, can it be said that "this does not determine where that centre is." Professor Airy concludes his letter with the following observations:—"Suppose it be known that a body does rotate, with re- ference to any specified axis, then the body may be said, with equal propriety, to ro- tate (*qy.* revolve) round any other axis parallel to the former, provided that this be accompanied with a statement of the motion of translation of the new axis relative to the former." It is difficult to comprehend the meaning of this paragraph, and had it not been written by such an authority as the Astronomer Royal, it would have been attributed to the want of knowing the distinction and the true meaning of the terms rotation and revolution, and the necessary situation of their respective axes.

The following paragraphs in the second letter of Professor Airy show that the terms rotation and revolution are not employed according to their strict meaning by astro- nomers:—"Nobody scruples to say that the earth revolves round its axis," and "it is true that if the motion of any point of the moon be laid down, conceiving the earth to be fixed, it shows distinct circular monthly rotation round the earth."

If astronomers confuse these questions by employing the terms rotation and revo- lution as synonymous, and actually use them as above, *vice versa*, we need not be surprised at the endless discussions and contradictions that have taken place on the single motion of the moon. Her Majesty's Inspector of Schools deserves our grati- tude for pointing out this error, and for his perseverance in striving to remove such a serious blot from *educational* astronomical books.

## STEAM-BOILER EXPLOSIONS, AND THEIR PREVENTION.

The recurrence of steam-boiler explosions, notwithstanding the efforts made to prevent them, is so frequent, that any proposition for accomplish- ing the desired object deserves at least a thorough and impartial investi- gation; and in case the arrangement proposed should appear calculated to answer the purpose, it is entitled to the greatest publicity. It is gene- rally allowed that the majority of the accidents occur from the deficiency of water in the boiler, and it is, therefore, evidently of the utmost necessity that it should be known when the water is becoming dangerously low, and before it is too late to remedy the evil. An ingenious contriv- ance, known as "Johnston's Self-acting Safety Alarm" (an advertisement of which appears in another column), appears worthy of attention, and in order that our readers may thoroughly understand its action, we subjoin a diagram of a section of the apparatus:—




There is nothing to prevent its proper action, and its arrangement can- not be injured without destroying it; whilst if there be any chance of damage from its position, and liability to be meddled with, it may be co- vered with a perforated metal cap screwed to the boiler, and thus placed entirely out of reach. The only working part is the valve at A. The float, a large hollow metal ball, is made sufficiently heavy that on falling with the water it cannot fail in opening the orifice, as the apparatus is entirely free from all stuffing-boxes, glands, cocks, or any other contriv- ances, which are so frequently found to operate against the proper action of alarms. As long as there is a sufficiency of water in the boiler, the alarm valve is kept closed against its seat by the metal float, when danger can scarcely be apprehended. If the water in the boiler lowers 1 in., the alarm can be heard from a great distance. It differs much from any other safety alarm; it attracts the ear, while steam guages only attract the eye.

THE IRON TRADE IN THE UNITED STATES.—An American correspon- dent, writing in the *Birmingham Journal*, says:—"The iron-works in the various parts of the country are in profitable operation, many of them increasing their pro- ductive capacity; but I can hear of no new ones being in progress or contemplation, except some small affairs in Pittsburg and Philadelphia, not of sufficient importance to require special notice, nor does the general trade itself present any new features or facts requiring record or comment. There are no failures to report, all are apa- rently enjoying moderate prosperity. The lack of skilful workmen is felt by many, and wages have considerably advanced in some localities. Our iron-works depend upon England entirely for rollers, and the number of fresh hands arriving is scarcely sufficient to counterbalance those returning home. In truth, the iron-works of this country offer no attractions sufficient to warrant any prudent workmen leaving Eng- land. Wages are a very little higher, and are often paid with great irregularity, and always partially in truck or 'store-pay;' employment is precarious, and during a large part of the year the heat of the weather renders labour in iron-works too oppressive to be endured for long by the strongest constitution; while the horrible cheap rum, which is the only substitute for their accustomed beer attainable by the majority of the poor fellows, soon breaks them down. In connection with this sub- ject of iron, I ought to call attention to a movement in the West, which is probably destined to have great influence on the iron trade of America. I allude to the pro- jected extension of the Cleveland and Pittsburg Railroad to Wheeling. More than 100 miles of this railroad runs through a well settled region; abounding in coal, iron, and limestone of excellent quality, at present untouched. The ore beds are said (in the report of the State Geologist) to surpass anything known in the United States, nor, it is supposed, can there be found on this continent such a concentration of materials, and facilities for the manufacture of iron, as exist along this road. The attention of capitalists has been directed to it for some time, the best locations are already purchased, and some coal mines opened. The iron for this extension is already purchased, and the first instalment of 900 tons arrived at this port last week. The road is expected to be completed before next winter. The widely extended in- terest felt in improved processes in steel making, which I believe I alluded to in my last, is by no means diminished, but has enlisted the attention of scientific men, and large capitalists in New Jersey and Pennsylvania, who now profess themselves san- guine of producing a fine cast-steel from the crude ore, as is done, I believe, at one establishment in Germany. Several new processes have been recently patented, by which it is expected that the price of steel will be considerably reduced, and the quality essentially improved."

## CORT'S IMPROVEMENTS IN IRON MANUFACTURE.

The petition of Mr. Richard Cort, the only surviving son of the late Henry Cort, on behalf of himself and three aged sisters, for a more adequate national compensa- tion for the services of their late father than two pensions not exceeding 19*l.* per annum each, is confined to the astonishing benefits derived by the British nation from his father's inventions, being equal to a saving of 500 millions sterling, and progress- ing annually at the rate of 60 millions sterling, besides securing for ever the inde- pendence of the nation over foreign powers for bar-iron, and extending its commerce to all the markets of the world. Mr. Roebuck, the Member for Sheffield, has presented both these petitions, and more than twelve Members have promised to support the appeal, most of whom have signed the general petition.

It has been said, by one who is well acquainted with all the discoveries brought to light in the history of human inventions, that these benefits constitute either a more prodigious claim on the justice and gratitude of the British nation than was ever known to exist in the world's history, or that the whole must be fabulous, and good for nothing.

The following evidence, in addition to the general petition, signed by the most emi- nent practical and scientific authorities, is recorded in the printed case of Mr. Cort, for the information of his subscribers, and proves beyond all question that the merits are undeniably established—at least, no one yet, for more than half a century, has attempted to refute them:—

1. The letter signed by 15 of the principal bankers and merchants, in 1794, to Mr. Pitt, then Prime Minister, declaring their sense of the unexampled commercial boon to the nation by the inventions of Henry Cort, after only nine years use of them.

2. The report of Sir Andrew Hammond, Bart., in 1801, then Comptroller of the Navy, to the Lords of the Treasury, declaring the widow and family of Henry Cort to be real objects for national relief.

3. The resolution of a general meeting of the iron trade of Great Britain, in 1811, signed by Crawshay, Hall, and Bailey, and forty other leading iron firms, acknowledg- ing their debt of gratitude to Henry Cort for his services in having introduced the puddling system to public attention, and for his invention of grooved rollers; and ratifying this admission by subscribing more than 800*l.* for the relief of his widow, the trade having realised, during the previous 23 years, profits amounting to nearly three millions sterling.

4. The sanction given by the Government to the petition of the late Mr. Conningsby Cort, and the recommendation of the merits to the attention of the House of Com- mons by the Regent, in 1812, when the saving to the British nation, from the inven- tions of Henry Cort, was 470 millions *less* than it now is, after 44 years additional unrequited use of them.

5. The estimate made by Mr. Robert Stepenson, in his address to the Institution of Civil Engineers, that the annual saving by railway conveyance alone is 40 millions sterling; while the saving on two million tons of rolled iron, yearly manufactured out of materials previously useless, and by British labour, cannot be estimated at less than 20 millions, as compared with foreign iron at more than 30*l.* per ton, giving a total saving of 60 millions sterling, now yearly progressing; so that, if the average saving in 20 years, since railways have been completely established, be taken at only one-fourth of the yearly saving, 300 millions sterling have been saved by them, owing solely to grooved rollers, there being no other means of forming the railway bars to be practicable, and re-rolling 200,000 tons of old rails every year. And as 30 million tons of bar-iron have been rolled in Great Britain since 1785, there has been effected (at only 10*l.* per ton) a saving of 300 millions sterling, thus making the total saving from Henry Cort's inventions, in railways and home trade, 500 millions sterling, be- sides the yearly saving, now progressing, of 60 millions sterling.

Lastly, the royal warrants, signed by their late majesties, George III. and IV., countersigned by three of the Lords of the Treasury, granting pensions during the last 62 years, and specially directing the amount of each to be payable "without ac- count," meaning without deductions; nevertheless, more than 1000*l.* have been de- ducted for taxes and fees, nearly one-half of which has been deducted at variance with two Acts of Parliament, from two pensions of only 25*l.* 6*s.* each, to the aged daughters of Henry Cort—total nett receipt in 62 years, 4080*l.*, being about the 130th part of one farthing in the pound sterling for 500 millions saved to the country, out of ma- terials previously useless, and by British labour, besides the other enormous saving now annually progressing.

TO THE HONOURABLE THE COMMONS OF THE UNITED KINGDOM.

The Petition of the undersigned manufacturers, consumers, and others, who feel that the nation has been greatly benefited by the use of British puddled and rolled iron, first invented and successfully established in all the Royal Dock- yards by the late Mr. HENRY CORT, of Gosport, in the county of Southamp- ton, iron manufacturer; for the safety of our fleets and seamen; for our naval and military defence at home and abroad; for railways, steam navi- gation, shipbuilding, agriculture, mining, domestic, and other purposes; and, lastly, for securing the independence of the British nation over foreign powers, for an adequate supply of bar-iron.

That previous to 1782 the whole population of Great Britain was every year be- coming more and more dependent on foreign powers for an adequate supply of bar- iron, the total make of pig-iron with charcoal fuel being only 17,350 tons, while the export, according to a return from the Custom House in 1812, did not exceed 427 tons.

That in 1783 and 1784 two patents were granted to the late Mr. Henry Cort, one for rendering pig-iron or other cast metal malleable in an air furnace heated by the flame of pit coal, without the aid of charcoal, or blast of bellows, or cylinders, termed pud- dling, and the other for rolling the iron into bars, or other forms, at a welding heat, through grooved rollers, never before used, and ever since universally adopted.

That from the year 1785 to 1854 the make of puddled and rolled iron has continued more and more to supersede the use of foreign iron, except for fine steel. The total quantity of pig-iron made with pit coal in 1854, by the last return from all the iron- works, was 3,585,906 tons, from which the total quantity of puddled and rolled iron may be estimated at not less than 2,000,000 tons; while the total quantity of the latter exported on the average of three years, ending January 5, 1855, from a return made to your Honourable House, was 856,738 tons.

That as the iron trade of Great Britain, at a general meeting in 1811, unanimously acknowledged that it was greatly indebted to the late Mr. Henry Cort for these un- exampled improvements in the iron industry of the country, whereby enormous sums of money have been less said to foreign countries for bar-iron, and more received from them for British puddled and rolled iron, while the wants of the whole popu- lation have been supplied out of materials previously useless, and by the labour of millions of the people, at a saving of more than 200 per cent., compared with the price of foreign iron in 1782.

Your petitioners humbly pray that your Honourable House may be induced to make some adequate provision for the declining years of the only surviving representatives of the late Mr. Henry Cort, being one son and three daughters, only one of whom is under 70 years of age, for having added by the inventions of their father at the ex- pense of ruin to himself and family, so enormously to the wealth of the country, year after year for more than half a century, besides extending its commerce in British iron to all the markets of the world.

And your Petitioners, as in duty bound, will ever pray, &c.

ANTHONY HILL, ironmaster, Plymouth Works, Glamorganshire
ROBERT STEPHENSON, M.P., F.R.S., Pre- sident of the Inst. Civil Engineers
CRAWSHAY BAILEY, M.P., ironmaster, Aberaman Works, Glamorgan
JOHN HEATHCOAT, M.P.
EDWARD JOHN HUTCHINS, M.P., Chairman of the Rhymney Iron Company
WILLIAM JAS. CHAPLIN, M.P., late Chair- man of the South-Western Railway
GEORGE HADFIELD, M.P.
GEORGE BOWYER, M.P.
WILLIAM CUBITT, Knt. } Late Presi-
JAMES SIMPSON, C.E. } dents of the
JOSHUA FIELD, C.E., F.R.S. } Institution
JAMES MEADOWS RENDEL, C.E., F.R.S. } of Civil Engineers.
GEORGE BIDDER, C.E., Vice-President of the Institution of Civil Engineers
CHARLES MANBY, C.E., F.R.S.
CHARLES FOX, Knt.
WILLIAM CUBITT, M.P.
WILLIAM E. BOYES, iron manufacturer, Swindon House
SANDERSON BROTHERS AND CO., manufac- turers, Sheffield
THOMAS TURTON AND SON, ditto
HENRY E. HOOLE, ditto
CHARLES SANDERSON, ditto
JESSOP AND SON, ditto
NAYLOR, VICKERS, AND CO., ditto
STEWART AND SMITH, ditto
DIXON AND SONS, ditto
MARSH BROTHERS AND CO., ditto
JOSEPH RODGERS AND SON, manufacturer Sheffield
WILLIAM J. HORN AND CO., ditto
JOHN SCOTT RUSSELL, C.E., F.R.S.
CHAS. HOOD, F.R.S., iron merchant
WM. B. CARPENTER, M.D., F.R.S., F.G.S.
JAMES BOOTH, LL.D., F.R.S., Chairman of the Council of the Society of Arts
EDWARD SOLLY, F.R.S.
ROBERT HUNT, F.R.S.
THOS. BENNET LAWES, F.R.S.
THOS. WEBSTER, M.A., F.R.S.
GEORGE RENNIE, C.E., F.R.S.
THOS. HENRY MAUDSLAY, C.E.
DAVID MUSHET
THOMAS PAGE, C.E.
ALEX. GORDON, C.E.
EVAN HOPKINS, F.G.S., C.E.
JOSEPH CUBITT, C.E.
D. T. EVANS, barrister, author of letters on the iron industry of South Wales
MACNAUGHT, THOMAS, ROBERTSON, AND CO., iron merchants
THOS. M. PAINE, R.A.S., Surrey
JOHN THOS. WAY, R.A.S.
EDWARD RAE, Wilsden House, Wilsden
JOHN FOWLER, C.E.
BOYD AND CHAPMAN, 78, Welbeck-street
JAMES S. WICKENS, 35, Mortimer-street, Cavendish-square
WM. BURTON, 39, Oxford-street
R. MIDDLETON, *Mining Journal*
THOS. BRETTELL, 25, Rupert-street
JOHN LESLIE, 59 and 60, Conduit-street.
&c., &c., &c.

ELECTRIC LIGHT AND HEAT.—Mr. F. Puls, of Soho-square, has patented an invention for a new electric light and heat, which consists in collecting and em- ploying the hydrogen and oxygen gases, separately or combined, generated from the decomposition of the water or exciting fluids in galvanic batteries, so as to obtain an amount of light and heat therefrom available for illuminating and supplying heat for domestic and general purposes. The vessel in which the batteries or piles are im- mersed is pneumatically or hermetically closed, for the purpose of collecting the said gas or gases, and causing them to pass to the burner, the poles of the said batteries or piles being connected by suitable wires of any convenient shape, form, or size, for the easy employment of the electric current, either for generating gas or gases to be mixed with the gas emanating from the battery, or for any other purposes where electricity is or may be employed; the gas of the said battery, when ignited, may then be di- rected against a wire consisting of any suitable material, as platinum, palladium, iridium, or otherwise, the said wire is thus heated to a white heat, and may also be connected with the battery or pile, in order to cause the current to pass through it, and give additional heat when the said electric current is not to be otherwise em- ployed. In place of the above-mentioned connecting wires, the gas or gases may be caused to pass through one of the fluids well known for carbonising them, as naphtha, benzole, camphine, or otherwise, or a mixture of them, for the purpose of producing direct a bright and luminous flame, in which case also the gases from the battery only may be used, and the electric current employed for the purposes above mentioned. Instead of a battery, use may be made of a series of plates, cylinders, or bars, of such substances as come within the electro-chemical scale, so arranged as to form a closed current between themselves.

ELECTRIC TELEGRAPH POSTS.—Mr. John Hamilton, jun., of Liverpool, has patented some improvements in constructing electric telegraph posts. A cast- iron plate is formed, with an upright tubular socket, which, at its lower parts, is made with openings, so that the earth may fall through, and fill in the interior of such socket. The upper part of the post consists of a wrought-iron tube, by preference coated with zinc, and its lower end enters the socket, and is fixed thereto by rivets or otherwise. The socket rises to some inches above the earth. The top of the post is covered in with a cap to throw off the rain, and transverse bars of wood are fixed to the upper part of the post to receive the wires.

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especially prepared to meet the requirements of the new Act for the Inspection of Coal Mines. It has met with the decided approval of many large colliery owners and managers. SIMPLE, EFFICIENT, and CHEAP. Price £1 10s. each.

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*Pimlico Slate Works, Upper Belgrave-place, London, April 7*, 1855.—GENTLEMEN: I very readily offer my testimony to the excellence of your slabs raised at the Machno Quarries. I prefer them to all others obtained in North Wales, with one exception, and that is much of the same quality as the Machno. The slabs can be obtained of large sizes, and of every requisite thickness. They are homogeneous in texture, strong, of good colour, free from spots and other impurities, pleasant to the tool of the mason, easily planed and moulded, and will bear exposure to a much higher degree of heat than slabs from any of the Carnarvonshire quarries.

Signed, G. E. MAGNUS.

To the Proprietors of the Machno Slate and Slab Quarries.

*Liverpool, Oct.* 18, 1855.—DEAR SIR: The experiments which I have tried on the specimen of slate, in reference to its capability of resistance to acids, enable me to pronounce it in every way capable of retaining boiling vinegar, without injury either to its own substance, or to the contained vinegar. A piece of the slate, weighing 95 grs., was exposed for 26 hours to the action of cold strong nitric acid; it was then boiled in the same acid for 20 minutes, and when washed, dried, and weighed, was found not to have lost perceptibly in weight. This I consider the most conclusive experiment. Signed, GEO. C. HUSON.

Wm. Orme Carter, Esq., Machno Slate and Slab Company.

All communications must be addressed to the resident director, Mr. T. H. WHEELER, Conway, North Wales.

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THE GARDETTE MINING COMPANY. DEPARTMENT OF ISERE, FRANCE. 149

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For particulars as to the Camel Mines, apply to the undersigned, who will furnish reports from Capt. Jas. Richards, of Devon Great Consols, and Capt. Thos. Richards, of Liskeard, late agent at the Camel Mines.

All moneys are to be paid to Messrs. Robins, Foster, and Co., bankers, Bodmin, Cornwall, and no expenditure will take place until all the shares have been allotted, and the first call paid.

If all the shares are not taken up within three months from this date, those having taken shares and paid the first call will have their money returned, minus the bankers' commission of 5s. per £100.

The sum of £300 will have to be deducted from the capital of the company, in order to repay cost already incurred by the present lessees.

At the first general meeting a committee of management will be chosen, and proper officers appointed, for conducting the affairs of the company, and for the economical and efficient working of the mines.

Dated June 29, 1856. W. DENHAM KING, Hon. Sec., pro tem.,

To whom application for shares must be made, in the following form:—

SIR,—I request you will allot me shares of £2 each in the Camel Copper Mining Company, and I agree to accept the same, or any less number that may be allotted to me, and pay the amount thereof by instalments, as required by your advertisement.

Dated this day of , 1856. Name.....
Address.....

To Mr. W. D. King, Camelford, Cornwall. 154

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TREBURGETT CROWAN CONSOLIDATED COPPER MINING COMPANY (LIMITED BY ACT OF PARLIAMENT).

SITUATE IN THE PARISH OF CROWAN, THE BEST MINING DISTRICT IN CORNWALL.

Capital £50,000, in 5000 shares of £10 each.—Deposit £5 per share. 155

The old shares of £1 each in the Treburgett Consols Mine will be received in exchange, and in payment of the deposit of £5 per share.

OFFICES,—No. 9, AUSTINFRIARS, LONDON.

The Treburget Crowan Consolidated Copper Mining Company has been formed to work three extensive and valuable mines, called Wheal Curtis, Wheal Strawberry, and Wheal Dumpling, in the parish of Crowan, in the county of Cornwall, in addition to the Treburget "Sett."

These mines are situated in one of the richest copper strata in the county, and are upwards of 1200 fms. in length, and 400 fms. in breadth on the course of the lodes: they adjoin and run parallel to the celebrated Wheal Abraham, Oatlands, and Crenver setts, from whence immense quantities of ore have been raised, and great profits realised.

The stratum is clay-slate, of the same character as that of Wheal Abraham, being on the same geological formation. Wheal Abraham was found rich in ore to full 200 fms. deep, and the opinion of the experienced mining captains, by whom the Crowan Mines have been inspected and reported upon, is that they will be found equally productive to a similar depth.

There are six well defined and known lodes in the setts. Wheal Curtis lode has been worked to a depth of 47 fms. below the adit level, and upwards of £10,000 worth of ore been raised. The Wheal Dumpling lode, which is 60 fms. south of Wheal Curtis, is sunk 27 fms. below the adit, and a level therefrom has been driven 40 fms. east of the shaft, through excellent tribute ground. This lode presents the certainty of proving a rich mine. Another lode intersects the Curtis and Dumpling lodes, and is seen about 4 fms. from the surface, where it presents a very fine gossan. There is likewise another lode south of Wheal Curtis, called the Drym lode, which has a promising appearance, and produces a splendid gossan. The remaining two lodes have not been opened upon, though their position and character have been ascertained.

The capital of the company is £50,000, divided into 5000 shares of £10 each, whereupon a deposit of £5 per share is to be paid, and the remainder called for as required for the mining operations, by instalments not exceeding 2s. 6d. per share, and that at intervals of not less than three months.

The company will be under the management of a board of directors, each of whom must be the holder of not less than 20 shares during his term of office. Periodical statements of accounts and reports will be submitted to the shareholders, and meetings of the proprietary duly convened, according to the Deed of Settlement constituted under the provisions of the Limited Liability Act, by which the liability of the shareholders will be strictly limited to the amount of their shares.

Abstract of prospectus and reports may be obtained at the offices of the company.

WILLIAM EVANS, Sec.

FORM OF APPLICATION FOR SHARES.

To the Directors of the Treburgett Crowan Consolidated Copper Mining Company (Limited).

GENTLEMEN,—I request you to allot me shares in your company, of £10 each, on which I enclose you a deposit of £1 per share, and hereby undertake to accept such shares, or any less number, and to pay the further sum of £4 per share on allotment, and the further calls as required, up to £10 per share, subject to the provisions of the Act of Parliament which limits liability to shareholders.

I am, Gentlemen, your obedient servant,
Name in full.....
Residence .....
Reference ..... Profession or business .....

---

THE MINERS' ELECTRO-CHEMICAL REDUCTION COMPANY. 156

FOR THE REDUCTION AND SEPARATION OF METALS FROM THEIR ORES.
By Her Majesty's Royal Letters Patent.

OFFICES,—4, UNION COURT, OLD BROAD STREET, LONDON.

Applications from Mine Proprietors, Smelters, and others, for LICENSES to USE the PATENT PROCESS of this company, may be made to, and terms and particulars obtained from JOHN HAMILTON CLEMENT, Manager.
April 25, 1856.

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SOCIÉTÉ PARISIENNE, FOR THE SUPPLY OF ENGLISH COALS TO PARIS AND THE VALLEY OF THE SEINE, AND FOR THE MARITIME CONVEYANCE OF GOODS. 157

Société en Commandite: FIRM—Ernest de Causans and Co., established in Paris.

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The English Subscription for shares in this Company will remain open until the 12th of July inst. (this day).

The first instalment is £5 per share, payable as follows:—On applying for shares, a deposit of £1 per share is to be lodged to the credit of the gérant and the trustees, at one of the company's bankers, who will deliver the provisional receipts for the same; and the residue of the first instalment will be payable within three days after the allotment, or the deposit will be forfeited. Should the number of shares allotted be less than the number applied for, the surplus of the deposit will be credited to the payment of the balance of £4 per share, payable on the allotment.

Interest at 5 per cent. will be allowed on the payments from the date of the payment of the first instalment.

The scrip for shares will be issued immediately after the definite constitution of the company, and due notice will be given thereof.

On the issue of the share certificates or definitive titles the shareholders may elect whether such certificates shall be for registered share or shares to bearer.

Application for shares will be received by E. P. THOMPSON, Esq. (W. Brandling and Co.), Newcastle-on-Tyne; WM. E. EDDISON, Esq., 2, Walbrook; at Messrs. A. and W. RICARDO'S, Angel-court, and Messrs. SCOTT, CORTHORNS, and SCOTTS, 16, Throgmorton-street; at Messrs. ARDOIN, RICARDO, and Co's., bankers, Paris; and at the offices of the company, 88, Cannon-street West, where also prospectuses and forms of applications for shares may be obtained.

All communications not pre-paid will be returned.

London, July 2, 1856.

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SOCIETE PARISIENNE.—Notice is hereby given, that for the ENGLISH SUBSCRIPTION the FIRST INSTALMENT of FIVE POUNDS per share will be PAYABLE as follows:—£1 per share on application for the number of shares applied for, and £4 per share additional when the shares are allotted. If the number of shares allotted be less than that applied for, the surplus of the deposit will be credited to the payment of the balance of £4 per share, payable on the allotment.—88, Cannon-street West, July 2. 158 GEORGE CLARK, Registrar.

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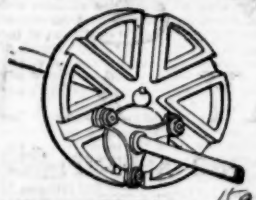

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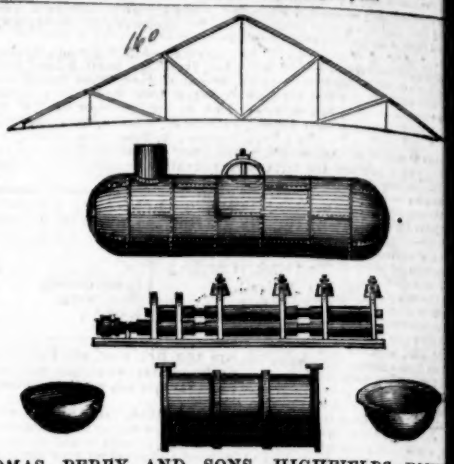

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